

cinefex

number 37
\$5.50
Canada - \$7.50



cinefex

...the journal of cinematic illusions

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CINEFEX 37 — February 1989. Published quarterly at P.O. Box 20027, Riverside, California 92516. Subscriptions (U.S.): four issues — \$17; eight issues — \$28; twelve issues — \$40. Return postage must accompany all unsolicited manuscripts, photos or other materials. Printed by Valley Printers, Riverside, California; color separations by Select Color, Ontario, California. Contents copyright © 1989 by Don Shay. All rights reserved. Reproduction in whole or in part without written permission is prohibited.

Special Effects — The Next Generation 4

The issue of visual effects had to be addressed early in the planning stages for *Star Trek - The Next Generation*. With fifty or more quality effects shots needed for each weekly episode — and only a modicum of time and money to spend on them — an alternative to film opticals was considered essential. Aware of advances in video effects technology, the producers turned to two of the most progressive video postproduction companies in the business — The Post Group and Composite Image Systems — to take them where no television series had gone before. *Article by Glenn Campbell and Donna Trotter.*

On the Fly — The Making of a Sequel 22

At the end of David Cronenberg's horror hit, *The Fly*, Veronica Qualife is left pregnant with the child of Seth Brundle, uncertain of what effect the mutant housefly genes that destroyed her lover might have on their child. First-time director Chris Walas — who as makeup effects supervisor had won an Oscar for the first film — was given an opportunity to explore the possibilities in *The Fly II*. Reuniting key members of his makeup and effects unit for the sequel, Walas translated onto film the physical metamorphosis of young Martin Brundle from normal human being to murderous mutant insect. *Article by Robin Brunet.*

From Science to Showbiz 46

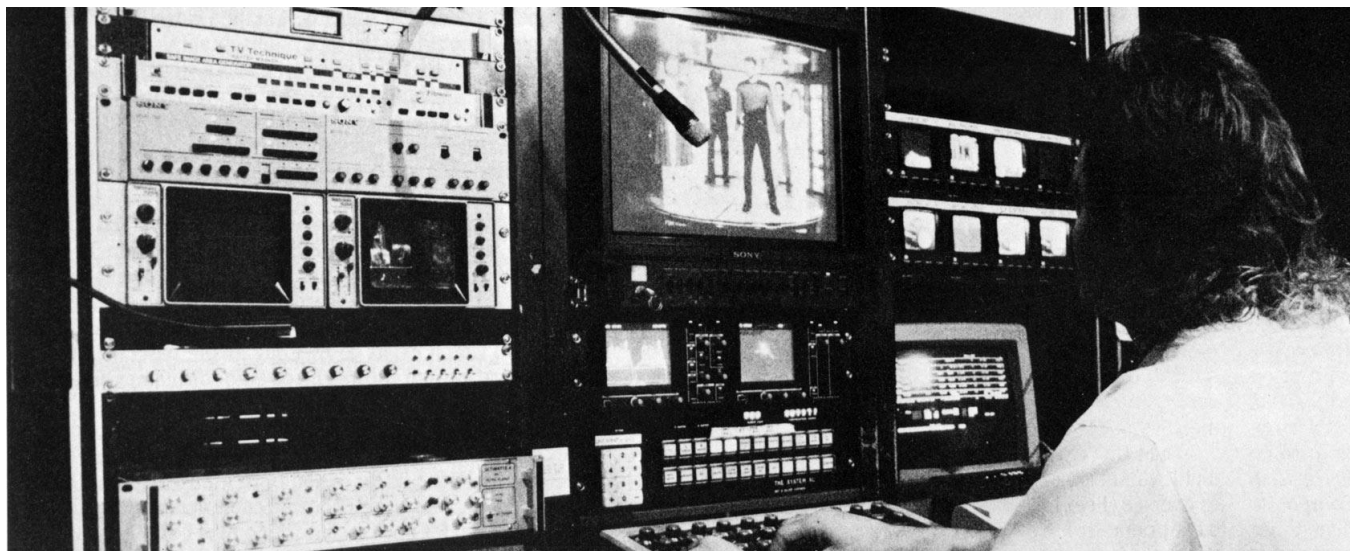
In a serendipitous merging of skills, equipment and opportunity, Oxford Scientific Films was founded by a group of university zoologists intent upon photo-documenting the microscopic wonders of the world surrounding them. Before long, the fresh perspective they brought to motion picture problem solving led to their involvement in a variety of feature film projects. Today — expanded into a full-service facility — Oxford Scientific is a respected leader among British effects studios. *Article by Pamela Duncan Looft.*

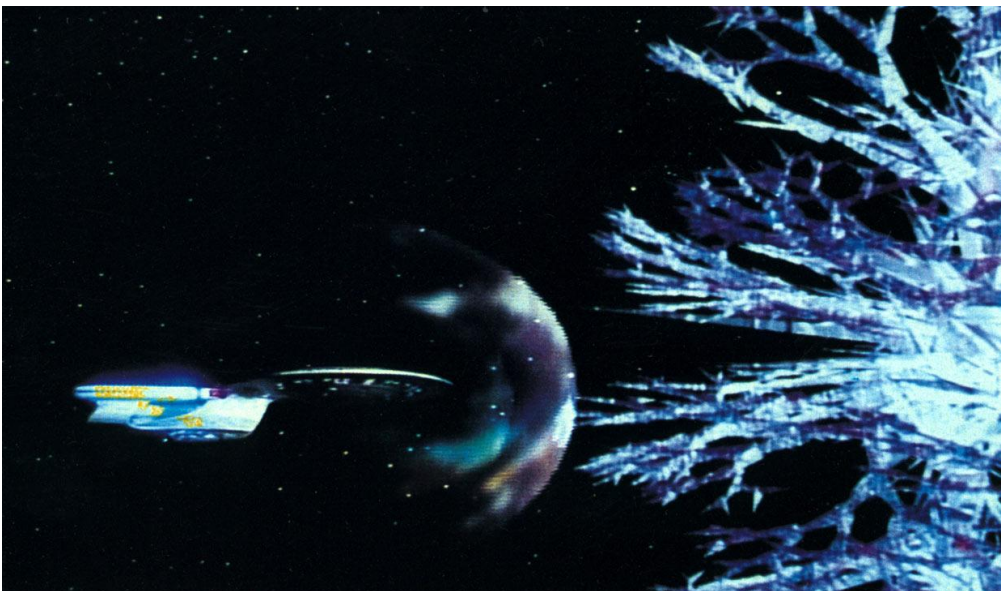
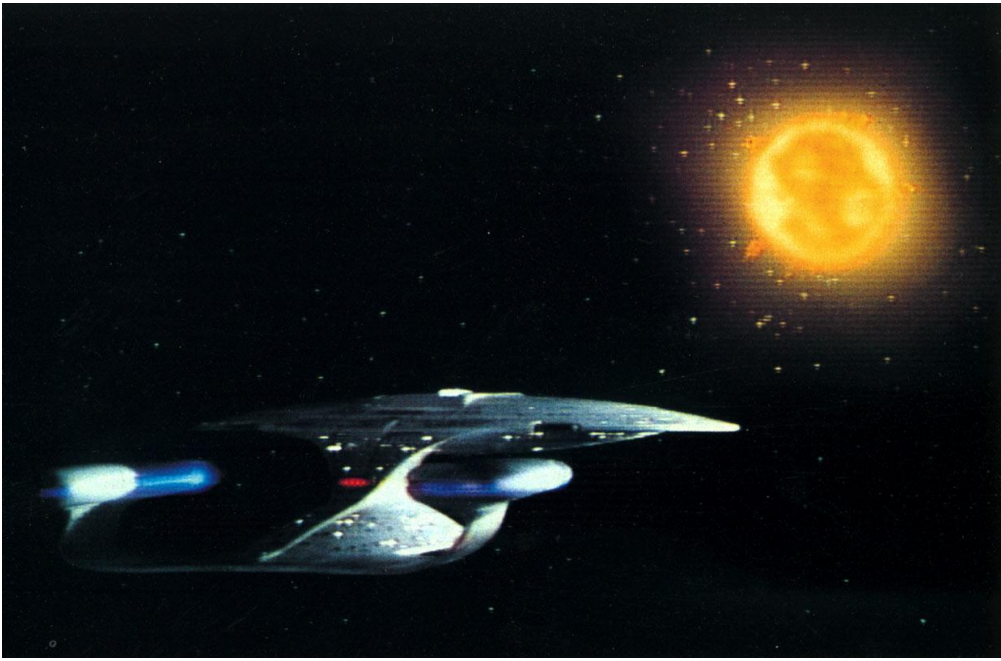
FRONT COVER — The new *Enterprise* in *Star Trek - The Next Generation*.
The form-altering Brundle telepod reactivates in *The Fly II* — BACK COVER.

SPECIAL EFFECTS

THE NEXT GENERATION



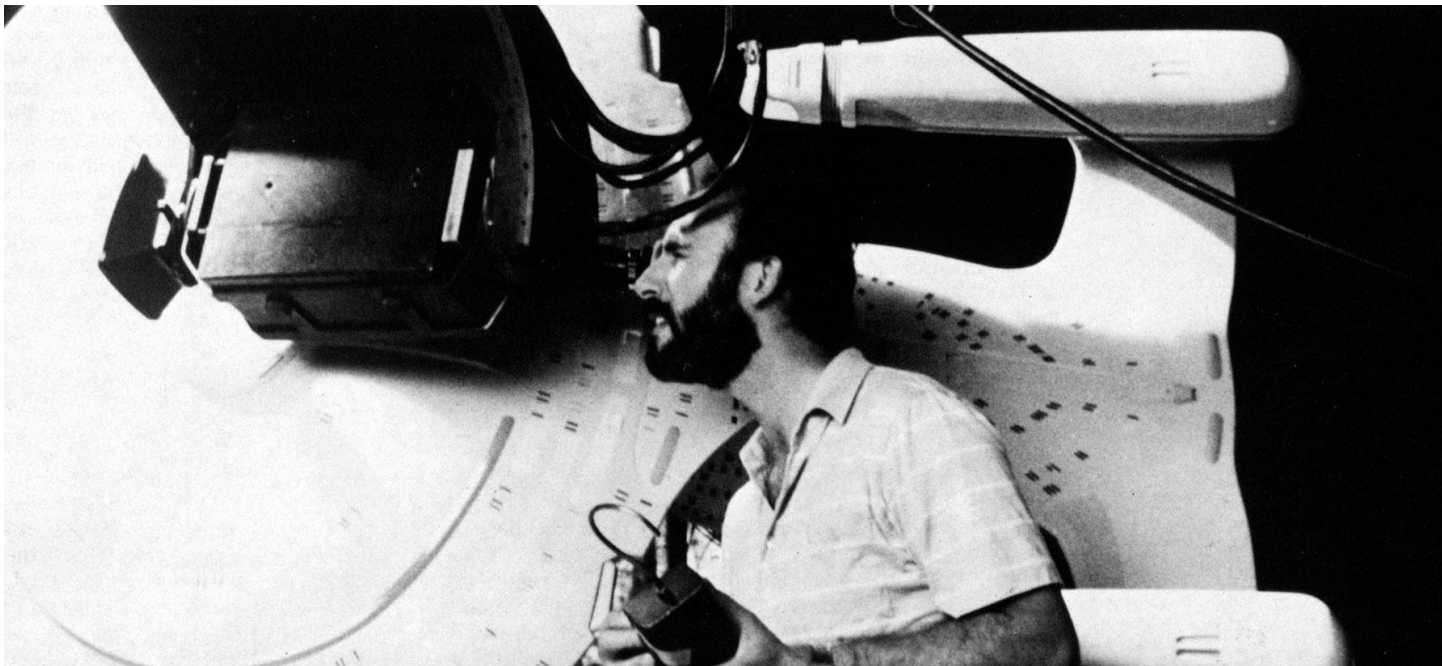


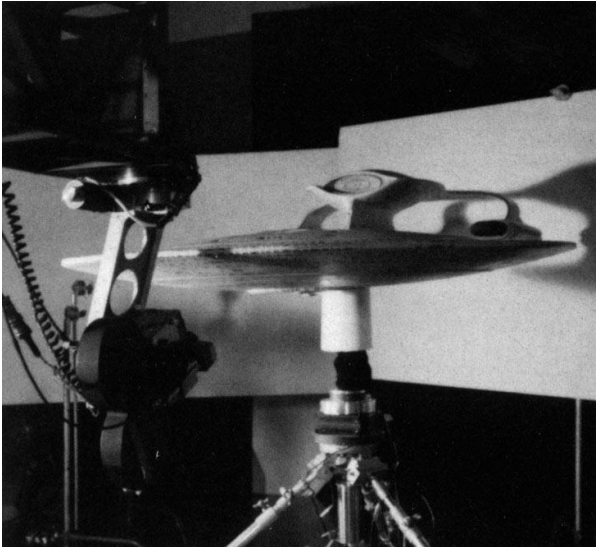


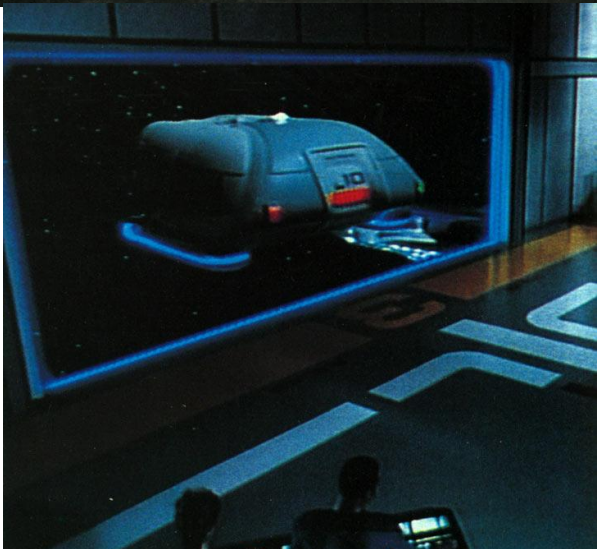
of its track, the sliver of light had re-
Enterprise — now fifteen feet away and
 — creating the effect of a stretched sta-
 the start and stop points of the camera
Enterprise could be made to literally st-
 demand.” Since streaking is an inherent
 — requiring several minutes per frame
 camera and stage time for hours or e-
 different warp drive shots were created,
 along with more traditional shots of the
 ferred as needed by Composite Image S-
 electronically by The Post Group.

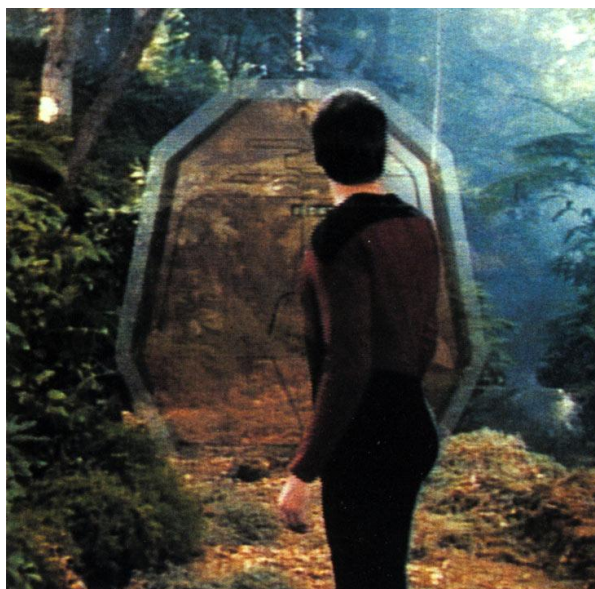
As straightforward as it may seem, it
 tively new. Thirty years ago there was no
 video were two very distinct and differ-
 live; film was recorded. There was no
 until 1956 that Ampex introduced the suc-
 cessful videotape recorder — but even
 thing as videotape editing. Industry ex-
 life for the new marvel. As far as they
 be no way ever to edit videotape — wh-
 up of invisible magnetic frames separa-
 thousandths of an inch wide. In respon-
 Ampex developed a basic editing meth-
 the introduction of magnetic marks —
 the edge of the tape. These edit pulses
 of the diagonal frame lines and were m-
 the tape to a chemical solution. A skilled
 a razor blade could cut the tape precisel-
 it was held in place mechanically. It was
 cutting process similar to the way film
 Video editing remained in this primitiv-
 duction of time code systems in the late
 was introduced, it was viewed as an elec-
 edge numbers on film. Time code ide-
 video frame uniquely by hour, minute
 acting in a sense as electronic sprock-
 Society of Motion Picture and Televis-
 establish a time code standard that w-
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 a standard which exists to this day as
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At its most basic, electronic editin-
 source and a videotape recorder — bo-
 rolling for a scene to be edited onto a
 editing systems using SMPTE time cod-
 desperate need for one machine to con-
 record units, making them the standar-
 day at the time. But the stage was also









number of other familiar illusions. "For the transporter effect," revealed first season effects editor Fred Raimondi, "the old TV show used aluminum dust sprinkled in front of a spotlight. We thought we could do better than that, so Rob Legato designed a new effect and brought all the elements to me. He had done some full-screen animation of blue streaks that dropped into frame over a black background and also some full-screen animation of sparkles. He wanted to combine them into an effect that would last five seconds, creating the element that would comprise the actual 'beam in' effect."

"Usually we do not use an element in its original state," Legato remarked. "We decided that the streaks needed more 'oomph' — so we took the streak element and displaced it by five frames in the DDR, creating a two-layered streak. That looked promising so we did it again, creating a three-layered streak. We added the twinkles to the streak element by doing a soft-edge wipe between the two, using our switcher which has a built-in wipe function. The wipe tracked the edge of the streak element, replacing the streaks with sparkles. Once we were happy with the transition, we dubbed it from the DDR to one-inch tape, which became our master 'beam in' effect."

Raimondi handled the actual hands-on manipulation as Legato directed the session. "First we generated the background plate of the crew members fading away by cross-dissolving between the full set and the empty set. Then we had our artist — Laurie Resnick — use the Quantel Paintbox to make articulate mattes with a soft edge. The Paintbox will accept live video from any source, enabling a single video frame to be painted with an electronic paintbrush. We can retouch any area using existing colors in the frame, or we can cut in any shade matte. For the transporter we used an airbrush-style function to create people mattes with a ghostly soft edge." A final subtle touch was devised to help blend the transporter effect into each live-action scene. With an Ampex Digital Optics — a device that manipulates flat video images in 3-D space — Raimondi was able to feed in the full-frame master transporter effect. "From there it was a relatively simple matter to position and rotate the ADO panel — which now contained the transporter effect — to fit over each actor individually, creating a sense of perspective and depth. As each shot progresses, a series of circular soft-edge wipes from the switcher is employed to manipulate the sparkles into various areas of the bodies." Though overused on low-budget commercials and football games, the ADO's ability to rotate and tilt a flat image stands it in good stead with Raimondi. "I used it to fit images into the viewscreen on the bridge of the *Enterprise*. In the old series, you saw the screen head-on or not at all. Using the ADO, I can fit an image into the viewscreen from virtually any angle or perspective on the set."

The Quantel Mirage — an equally useful device in the editing bay — works along similar lines as the ADO, but with some

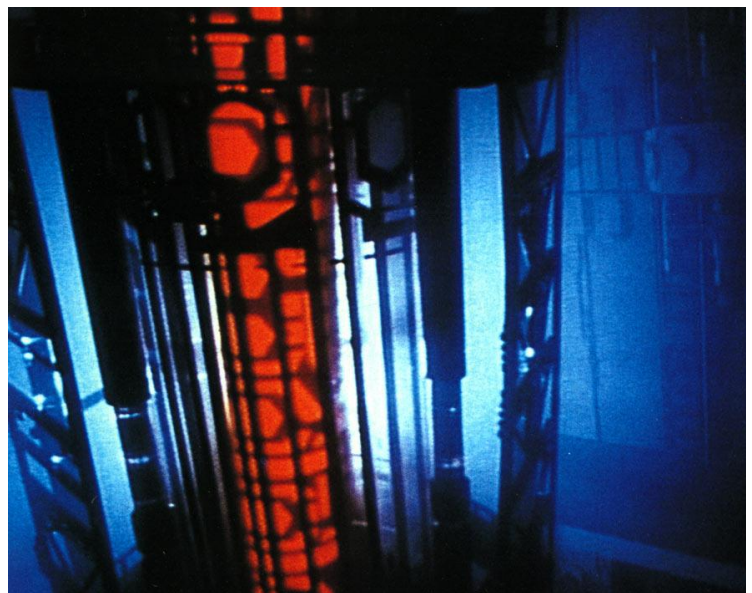
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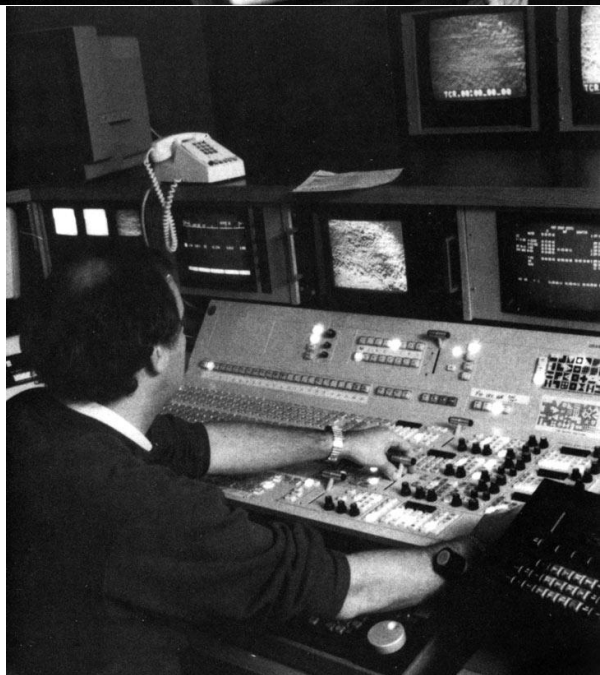
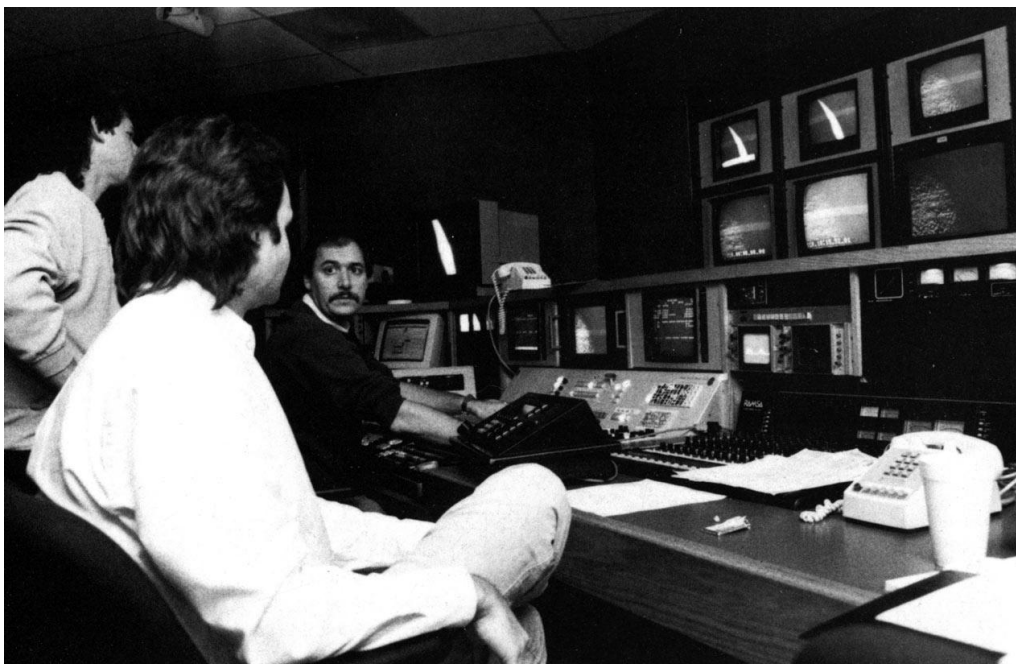
are so many things that we do on a daily basis in video that film effects would love to have. Things we do in a morning could take *weeks* on film. We make planets, composite bluescreen shots and create animation — all in the space of a few hours."

"We had a scene in 'The Last Outpost' episode," Legato illustrated, "where several characters were examining a computer generated display which was constantly rotating in midair — a hologram simulation. The sequence lasted *four* minutes! You can easily imagine the horrors of generating a real computer graphic and comping it into a four-minute scene on film for a television show." The video solution to creating the display was to shoot flat graphics artwork — rendered by Michael Okuda — on the graphics camera. "We then generated three separate pieces of the artwork and fed them into the ADO. It was very simple to create a dimensional look just by separating the ADO frames in size by a few inches. Then we used the ADO to turn them in three dimensions, rotating the three panels of artwork around a center axis. It was very effective."

As in all effects work, some of *Star Trek's* effects are added solely to mend seams in the production. "In the 'Datalore' episode," recalled Raimondi, "there is a sequence in which the android Data and his evil twin Lore are undergoing an examination. In the course of the scene, Data is opened up to see how he is wired so that the circuitry can be repeated on his brother. In the medical center we inserted footage on the monitors of the operation in progress. Unfortunately, the matted monitors looked exactly like phony matted monitors. To take the curse off it, we put the whole frame in the Mirage and added overhead lights from the Mirage's light sources to make it look as if operating room lights were casting down onto the scene. The lights also produced a 'hot spot' on the screen which helped make it look like the image was part of the scene instead of an obvious matte."

Obvious mattes were the one thing Legato could not afford on the 'Datalore' episode. The entire show depended upon the successful employment of actor Brent Spiner in a double role and Legato knew well that effects-wise audiences would quickly notice inept split-screen work. Fred Raimondi manned the switcher for the complex dance of moving matte lines needed for the show. "One fairly memorable split-screen shot had the two characters on opposite sides of a waist-high table. The Data in the foreground poured a glass of champagne and the Data in the background picked up the glass and drank from it. Of course, the shot was split down the middle, but this time it was necessary to move the split line during the shot. By using the switcher, I was able to make a split line between two separate takes, swinging a soft-edged wipe back and forth as needed. The real trick was to match the levels of brightness, contrast and color between the two tape machines. Once that was set, I could sync the two machines up using the editor and program the







A Starfleet officer whose body has been commandeered by alien parasites is destroyed by phaser fire in 'Conspiracy.' To achieve the shot, effects crew members constructed a dummy head packed with meat and pyrotechnic squibs. An image of the actor was then isolated on the Quantel Harry — a high-tech device for video animation and roto-scope work — and composited over the head. Animation was employed for the phaser beams and for the effect of burning flesh just moments before the head exploded. / Motion control model photography and a stock pyrotechnic explosion were combined in 'Heart of Glory' for a shot of the hijacked space freighter Batris being blown up by Klingon pirates. / A team from the Enterprise beams onto a barren planet in 'Loud as a Whisper.' Stage footage of the actors was treated with the transporter effect and reduced in size to fit on a

were scanned separately during transfer and then digitally composited. The final effect gives the impression of a live-action move or a motion control pan, yet is much more time- and cost-effective. It also breaks the curse of static bluescreen shots involving actors — a dead giveaway in most effects work." Panning and scanning anamorphic film is an old technique, but *Star Trek* is the first show to design shots on anamorphic film for intentional use of pan and scan. "We do not shoot a lot of anamorphic, but it does add a casual sense of realism to a shot when we do. Sometimes I will even have a person walk across the room so that I can simulate an on-set dolly move with my pan. This really ties the actors into an effects scene and makes the audience accept it much more readily."

The anamorphic scan technique was similarly employed on a more complex effects sequence involving Captain Picard (Patrick Stewart) in 'The Battle' episode. Legato and Don Lee — the Rank transfer expert at Composite Image Systems — worked out a handsome composite with Picard and several 'ghosts' who appear on the bridge of his abandoned former starship. "The captain is reliving a past battle as he sits alone in his chair," explained Legato, "and slowly the transparent images of his old crew appear at their stations. As the scene progresses, Picard walks from one side of the bridge to the other and talks to the ghosts who are seated at solid consoles. We shot the bridge as a static wide-angle anamorphic plate with Picard pacing around alone. Then a week later we shot our ghost actors against black as a static anamorphic plate, placing them in the same positions where the consoles would be. We needed four or five ghosts but only had two actors, so we photographed them in different positions on several passes to create more ghosts on film. We shot them about three-quarters of a stop overexposed with a lot of diffusion to give them an ethereal glow. And they were shot against black so that we could just double-expose them into the scene and maintain the glow. Then all we had to do was generate a matte for the consoles and pan around the frame with Picard, repeating the move for each element."

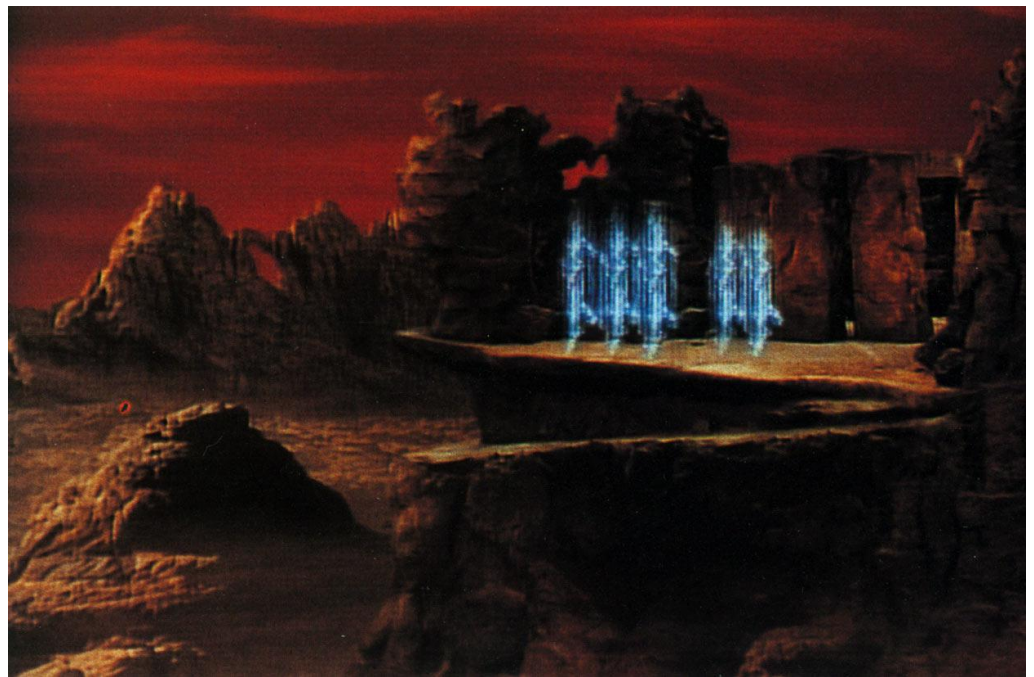
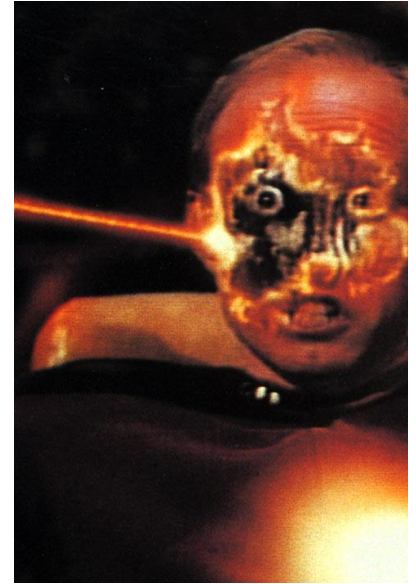
Later in the same episode, the delirious captain executes a warp maneuver with his spacecraft that somehow places the ship in two different places at the same time. To demonstrate this condition, a dual streak effect was to be employed. But unfortunate delays left the crucial photography undone until the last minute. With only one day to create the effect, Legato shot the streaks on Kodacolor print film on a Saturday, hustled the film to a one-hour photo shop for processing, ran the uncut negative on a Moviola to check the moves and then shot the final approved move on motion picture film. Though many

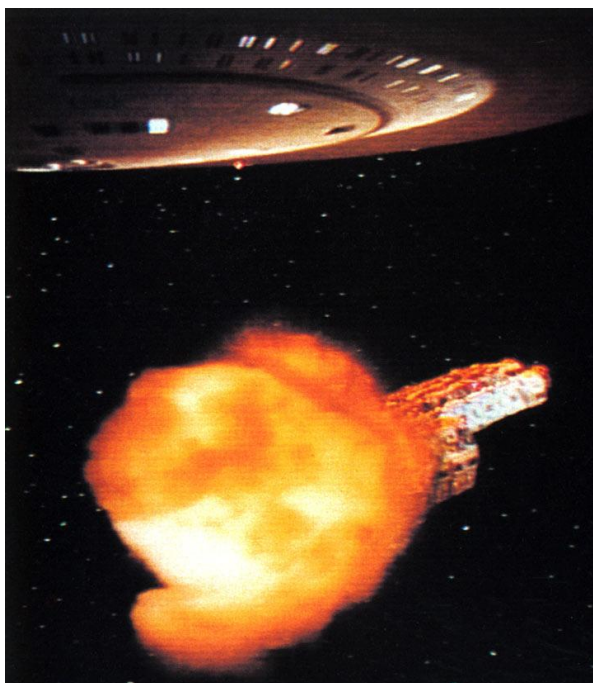


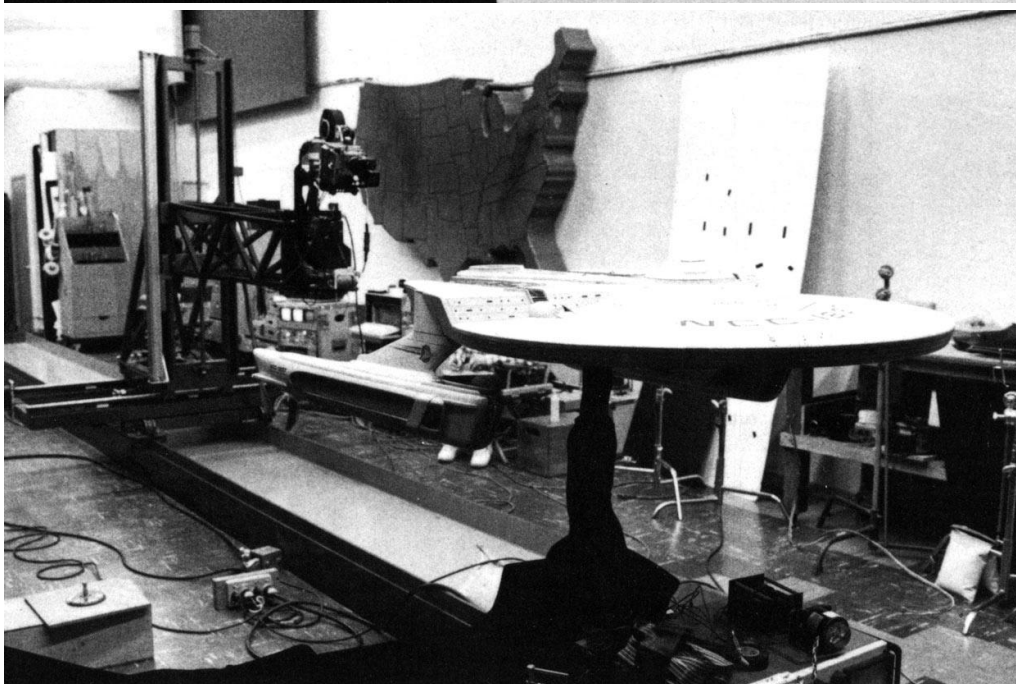
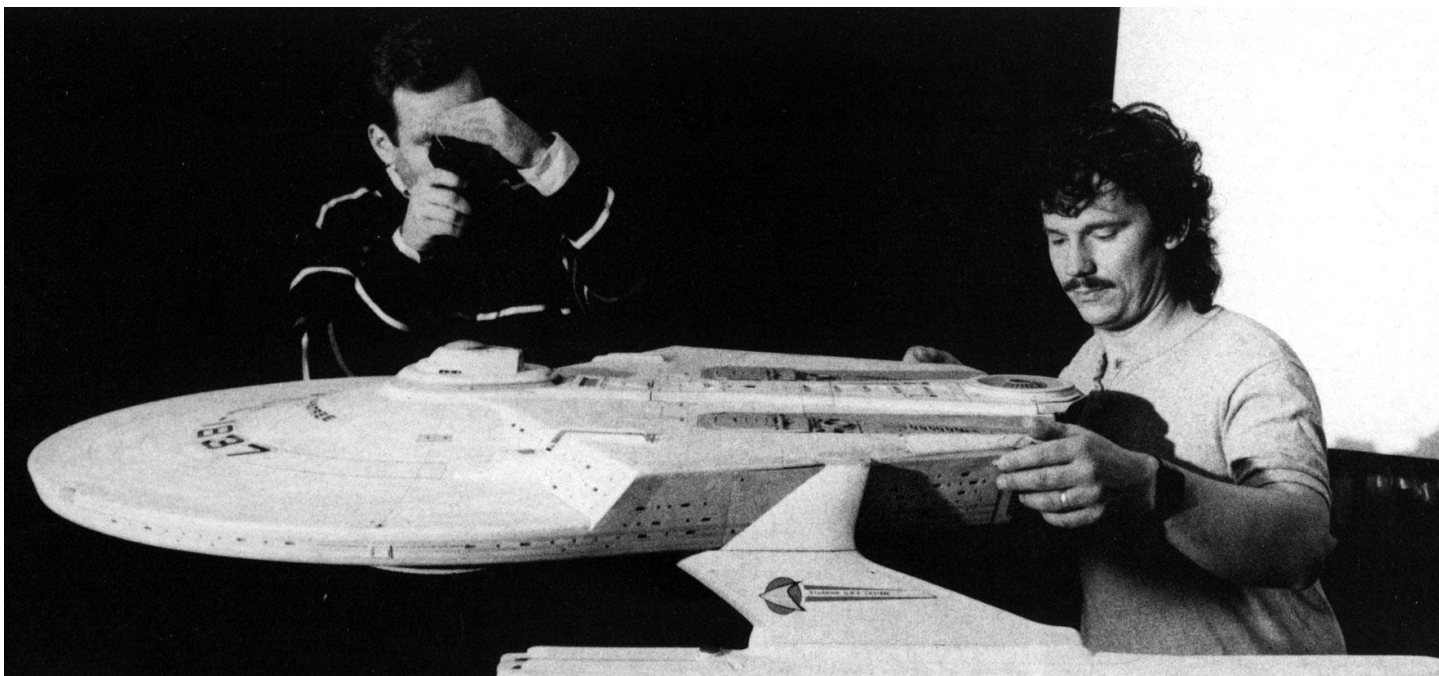
were scanned separately during transfer and then digitally composited. The final effect gives the impression of a live-action move or a motion control pan, yet is much more time- and cost-effective. It also breaks the curse of static bluescreen shots involving actors — a dead giveaway in most effects work." Panning and scanning anamorphic film is an old technique, but *Star Trek* is the first show to design shots on anamorphic film for intentional use of pan and scan. "We do not shoot a lot of anamorphic, but it does add a casual sense of realism to a shot when we do. Sometimes I will even have a person walk across the room so that I can simulate an on-set dolly move with my pan. This really ties the actors into an effects scene and makes the audience accept it much more readily."

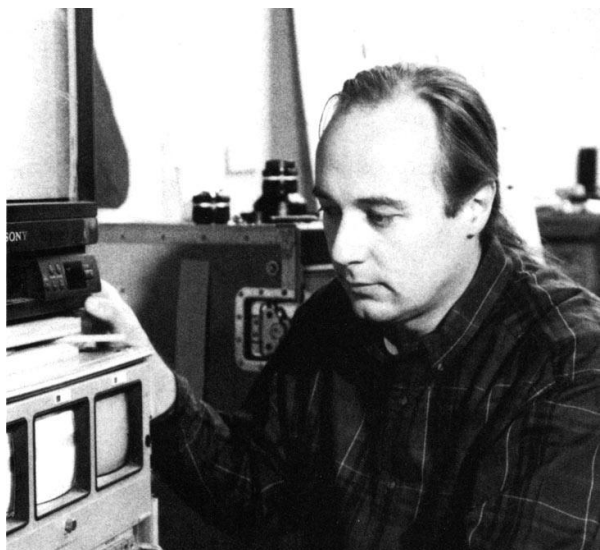
A Starfleet officer whose body has been commandeered by alien parasites is destroyed by phaser fire in 'Conspiracy.' To achieve the shot, effects crew members constructed a dummy head packed with meat and pyrotechnic squibs. An image of the actor was then isolated on the Quantel Horn — a high-

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ON THE FLY

THE MAKING OF A SEQUEL

article by
Robin Brunet







"We wanted to take audiences on a ride," observed producer Steven-Charles Zwick, "observing their decision to shoot a sequel to their first film involving the title character and the director wanted to deliver more of everything or was that we had to do it with roughly the same budget and money as we had on the original." A fact that Brooksfilms was asking without the guiding force of director David Cronenberg managed to take the first film's elements of sentimentality and craft from them a new obsession and love. Hoping to sustain the success of the first film, Brooksfilms had approached the director to direct the sequel in mid-1987, but found him irreconcilable. Stuart Cornfeld — producer of *Dead Ringers*. Stuart Cornfeld — producer of *Dead Ringers* — had already tapped Chris Walas to executive produce the winning makeup effects for *The Fly II*. When that Cronenberg would not be available to direct, his hand at directing — approached Cornfeld to helm the project himself. Walas knew the challenges of shooting and was arguably the one person on the crew who could meet the stepped-up price tag of the sequel and still keep within its budget. Acting on a strong endorsement from Zwick, Cornfeld signed Walas to direct and produce to oversee a number of other projects.

The sequel begins with Veronica Quaquina, daughter of the late Seth Brundle. Their offspring blossoms at a startlingly accelerated rate, blessed with his father's scientific intellect and a rapidly evolving set of housefly genes. Or Brundle (Eric Stoltz) is raised under the tutelage of scientist Anton Bartok (Lee Richardson) who develops telepod prototypes in a massive facility. They cannot get them to work. It is Bartok's desire to harness the genius of Martin to complete the machine by his father. Growing up in a sterile environment surrounded by circuit boards, Martin nonetheless manages to become intimately entwined with computer operator Zuniga just as his insect genes begin to trigger a physical metamorphosis. By the time the evil intent behind Bartok's solicitation of Martin is fully transformed 'Martinfly' — complete vengeance. Retreating into the dark recesses of his mind, man-fly hatches a bloody plot to sacrifice himself in a desperate attempt to restore his own humanity.

"The difference between Martin's metamorphosis in the first movie," observes Zwick, "is that ours is a natural evolution rather than a genetic experiment."



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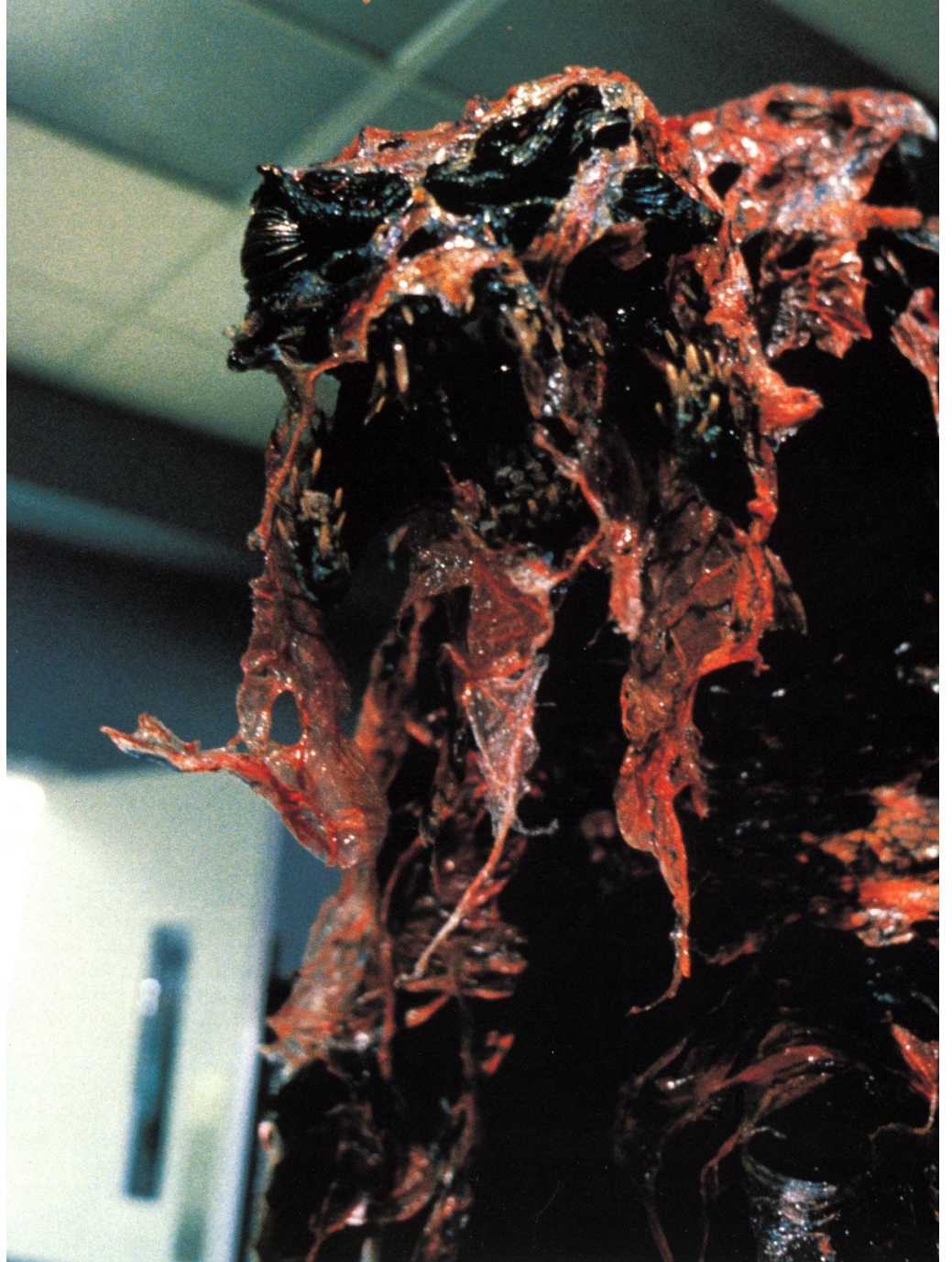


finishers and things were getting tight. Alan Peterson, Erik Jensen and Kamela Portuges had to be fast and accurate." Once the bug skins and rigs were completed, Kelly Lepkowsky and Buzz Neidig directed their efforts toward developing suitable paint applications. For the bugs, it was necessary that the paint stretch with the flexible creature skin and that it be able to endure several months of rugged first unit shooting. "For durability," said Lepkowsky, "we used naptha paints which we airbrushed onto our puppets. The overall goal was to create something beautiful and colorful — not monster green or brown. Universal colors blended with metallics produced the iridescent quality that Chris was after. To insure accurate color, film tests were done daily on the Fuji stock that was going to be used during principal photography. At times our mixtures resembled an auto paint shop gone crazy." Urethane parts accepted the airbrushed paint with minimal difficulty. The latex foam, however, required overpainting to heighten the intensity of the blue-green color scheme. Painting challenges extended to the cocoons as well. "The cocoons had to be beautiful and transparent," said Neidig. "I used a combination of metallic paper and Tamiya paints outside and inside to show a slow metamorphosis leading to the hatching of the creature."

By late April, most of the creatures and related artifacts were completed and on their way to Vancouver where sixty hectic days of principal photography were about to begin. The first animatronics effect in the film — a chilling enactment in which Veronica gives birth to a larval sac containing her mutant offspring — was likewise the first major effect to go before the cameras. Although most of the CWI contributions would not be required until late June and July, the larval birth sequence was scheduled early in the shoot while many of the more expansive sets were still being completed. Mark Walas was the designer and principal puppeteer. "The larval sac was sculpted by Howie Weed and mechanized by Mark Rappaport. Actually it was two separate rigs — a cable-controlled puppet for scenes of the sac being held by the doctor and a simple prescored skin for later when the baby breaks out. Once the mechanized larval sac was placed in the incubator, we switched over to the skin which was bolted down around a hole in the incubator base. From the back of the unit I was then able to use a pair of baby arms on sticks and some bags of goo to create the effect of the infant struggling from the inside to get out. At the end of the scene — when the child is being held up for Bartok to see — we used a real baby coated with rice pabulum."

Although young Martin appears to be a normal human child in most respects, his physical maturation process quickens at an alarming rate — five years for every real year spent in the Bartok complex. The first indication that his latent fly genes are developing as well occurs when an army of houseflies form an outline of his hand on an aquarium he has touched. "We tried

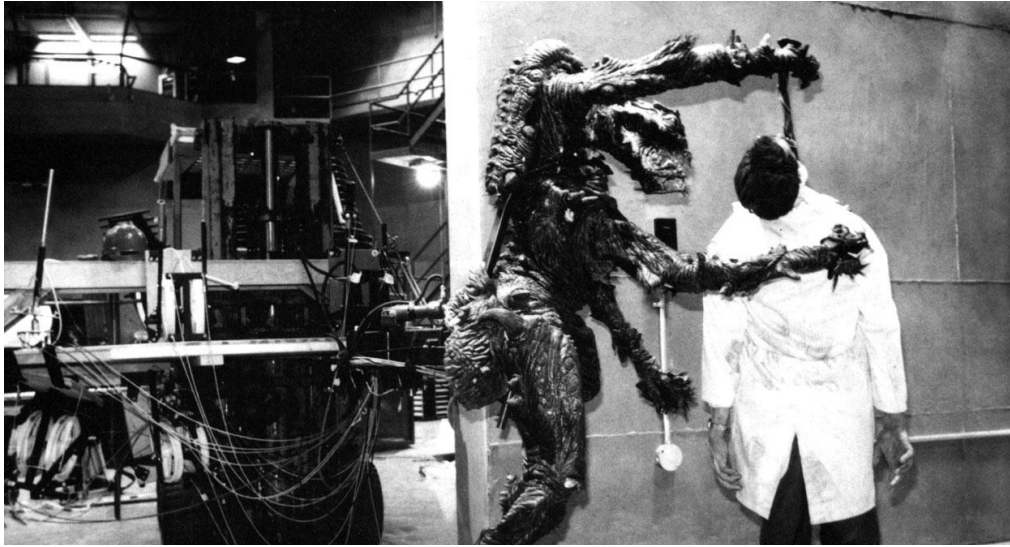
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Sculptor Buzz Neidig dresses the bug creature with slime prior to a scene in which it tosses Shepard across the laboratory. / In an early test of the closeup walking rig, Don Bies and Tamia Marg fit David Mylrea into a set of mechanized leg extensions that would enable him — when suspended from a boom arm — to create convincing simulations of bipedal movement. / Chris Walas demonstrates an alternate set of legs developed for closeups when the walker was either too large or too time consuming to employ. / Studying their actions on a video monitor, Walas and Mark Rappaport choreograph the animatronic bug in preparation for an elaborate Steadicam scene. Assisting are sculptor Howie Weed and creature effects supervisor Jon Berg. / Surrounded by

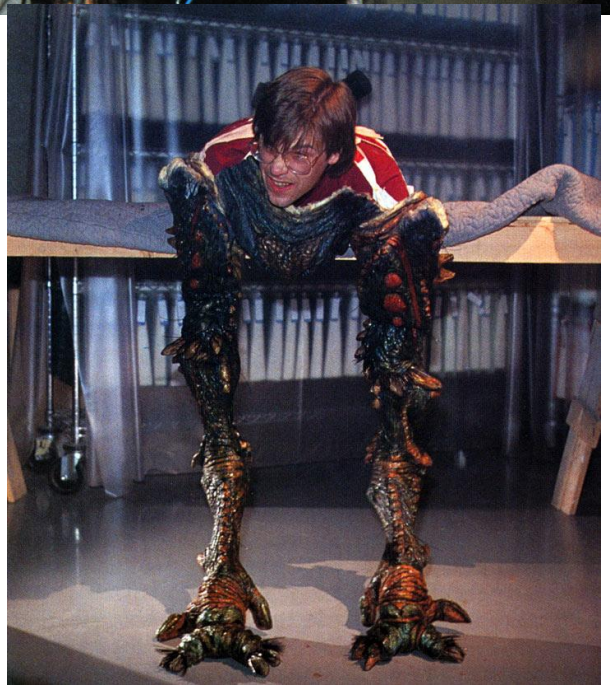
appliances to suggest a hideous mass of body lumps and also altered Stoltz's fingers by attaching webbing and claws to the knuckles. The revised stage four makeup took seven hours to apply, after which Stoltz was escorted to the set where he spent an additional five hours being slipped into the latex cocoon and covered with veins and blending pieces. The finishing touch was Halloween spider webbing purchased from a novelty shop. To the immense relief of both makeup team and actor, the new makeup registered well on film and the scene took only a single day to shoot.

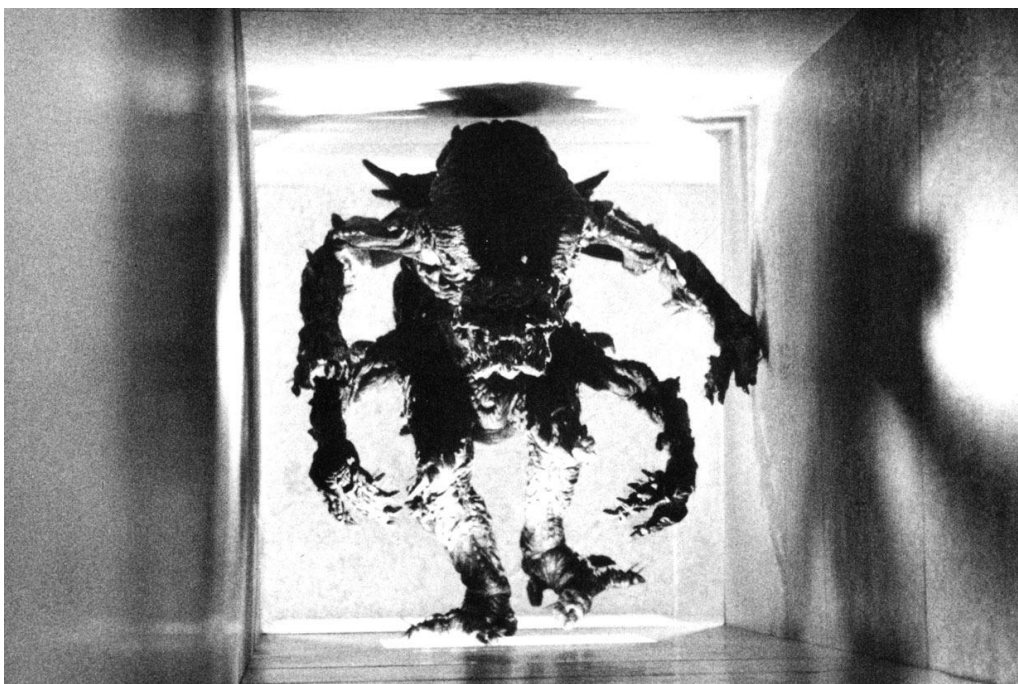
Enveloped by the cocoon, Martin is helicoptered back to Bartok Industries where he undergoes his final transformation into a man-size insect. Dupuis had taken Martinfly as far as it could go with makeup — from this point on it was up to the animatronics crew to convincingly portray the character. "We actually sculpted the final stage cocoon first and then worked backwards to create the preceding cocoon stages," said Jon Berg. "The first stage final cocoon was coated with resin, filled with water and reinforced at strategic places with metal. Into that we placed a hand-operated Martin bust that is glimpsed only briefly in the film. Later we animated the second stage cocoon simply by having operators underneath the table flex the vinyl. For the scene in which the fly breaks out of the cocoon, we used a head and shoulders puppet also manipulated from beneath the table. The cocoon had been prescored, then covered with latex webbing and ultraslime so that when the fly emerged all this stuff would be stringing from him."

The fully-developed Martinfly goes on a rampage in the laboratory, hunting for Bartok and being hunted in turn by a squad of armed guards. The initial stalking scenes were actually filmed during the first week of production. Staged in the bowels of a downtown Vancouver office building, the sequence utilized several CWI bug puppets and some associated rigs engineered by John Thomas. Considering the nature of location shooting for an effects-laden project, the challenge of these particular shots lay in the fact that the animatronic bugs were required to make sharp right-angle turns in corridors that were only six feet wide. To achieve the desired choreography, Thomas and assistant Lars Lenander built a jointed boom arm that could transport the bugs in a straight line and also whip them left or right depending on the shot. A scene in which Martinfly raises himself up to full height in front of a startled guard dog was one that was staged in the office building basement. "We attached six wires to our puppet and raised it up using pulleys," explained Michael Steffe. "Since we could not sink bolts into any part of the corridors, we attached our pulleys to an overhead scaffolding. All told, we spent a week on location and probably saved a lot of money by not having to build these intricate corridors."

"When we saw how John Thomas' rigs complemented our







that we eliminated most of the hand call a lever pull a cable, we used the concept two sprockets around which a chain would claims that the system harkens back to the effects. By going that way we had a great our bug limbs and such, no cable slipp spring-action return. We ended up using we could in scenes requiring puppet art

Another animatronic innovation was hard-wire radio controls for several developed by Lepkowsky. Although CWI had technology in the past, its susceptibility to air the cause of many a ruined shot. Built prior the hard-wire system used in *The Fly II* sent the control box through a wire rather than effectively eliminating interference and its limitations. An additional advantage was that from the limitations of standard radio which — except for the joystick's ideal conditions — are difficult to adapt to special elements. With hard-wiring capability, Lepkowsky custom-designed controls. For one head activated seven servos plus a unique dual-made the eyes move independently of each other. Biologically appropriate, Walas declined fear that the fly would appear drunk and

One of the radio-controlled heads — the office basement location — featured a controlled mechanism that allowed the creature to move angrily. "This movement was really unique" and appeared very sinister on screen. The head remained level and sometimes even dipped as if the creature were preparing to strike. The joint set at the base of the head and shoulders that could swing back and forth. Both were activated by cables — four for the head and four for the pivot. We wound up using that throughout the course of filming — in fact, the back became somewhat of a fly character.

Though full-size puppets were used for the scene, it was conceived as a miniature. For it, a fourteen-inch rod puppet bug was shot as a puppet of one of the Bartok technicians in the corridor. Intended for a sequence in which Martinfly on one of his video monitors, it was as a wonderful opportunity to show the



that we eliminated most of the hand call a lever pull a cable, we used the concept two sprockets around which a chain would claim that the system harkens back to the effects. By going that way we had a great our bug limbs and such, no cable slipping spring-action return. We ended up using we could in scenes requiring puppet art

Another animatronic innovation was hard-wire radio controls for several detected by Lepkowsky. Although CWI had technology in the past, its susceptibility to air the cause of many a ruined shot. Built prior the hard-wire system used in *The Fly II* the control box through a wire rather than effectively eliminating interference and interments. An additional advantage was that from the limitations of standard radio which — except for the joystick's ideal conditions — are difficult to adapt to specialments. With hard-wiring capability, Lepkowski custom-designed controls. For one headvated seven servos plus a unique dual-made the eyes move independently of each

neck skin. When air between the appliance and skin was sucked away via a mouth tube, the skin collapsed against the appliance to complete the apparent disintegration. Meanwhile, the head and jaw were manipulated by Kelly Lepkowsky whose arm reached up through the throat. Altogether, five people were required to operate the many air, blood and water lines.

The long-awaited filming of the leaper puppet afforded yet another opportunity to showcase the animatronics technology. To propel the puppet through the conning tower window, the crew relied again on a John Thomas catapult rig mounted directly behind the window out of camera range. The rig consisted of a ten-foot section of linear rail track, a pneumatic piston and a fiberglass seat with self-releasing pins that would hold the puppet in place until it reached the end of the track. At that point the pins would open — releasing the bug — and the seat mechanism would snap back to avoid being seen by the camera. 'As the seat holding the bug shot down the track,' Thomas explained, 'six trip releases were activated that in turn produced all of the effects visible in the final scene. Holding the bug in place were two vice grips attached to wires that would yank them open when the bug hit the end of the track. Almost simultaneously, two other cables pulled the bug seat back out of camera range. Then we had a glass-shattering gag — a microswitch on a hair wire placed a foot away from the window — and finally we had the explosive charge inside the bug that released its arms and head as it went through the window.' Four cameras recorded the bug launch, which was staged twice. Amazingly, with each attempt the bug cleared the narrow window frame and landed on its mark — thirty feet across and down into a catch net. 'A lot of people might wonder why we did not just shoot the bug out of an air cannon. Even if we could have worked out a way to trigger the release of the springs, an air cannon would have been too imprecise for this particular shot. Jon Berg did not want to see the head of the bug snapping off on the window frame on the first take.'

After smashing through the conning tower window, Martinfly lands stealthily on his feet — an effect achieved with the new and improved closeup walker rig. Adhering to *The Fly II*'s production philosophy that the simpler the animatronic concept the more natural it would look on screen, the walker rig was simplicity itself. A diminutive stuntman — four-foot-nine-inch David Mylrea — slipped his legs into the upper thigh section of a pair of fly legs equipped with stirrups that activated the cable-controlled calves and feet. After exploring several different articulation approaches, Michael Steffe devised a cable and

A specially rigged puppet is readied for a scene in which it will vomit corrosive enzyme into the face of security guard Mackenzie. / Gelatin facial appliances — complete with a thin underskull containing teeth and a movable jaw — were applied to stuntman Tim Andres and then 'dissolved' on cue through the activation of bubbling antacid and hidden wire gags. / Security chief Scorby has his back broken by the vengeful marauder. / For a follow-on shot in which the officer's shattered body is flung forcefully across the lab, a puppet replica of actor Gary Chalk was joined at the head to an air cannon and launched feet first through the air. / The actual back-breaking effect was achieved

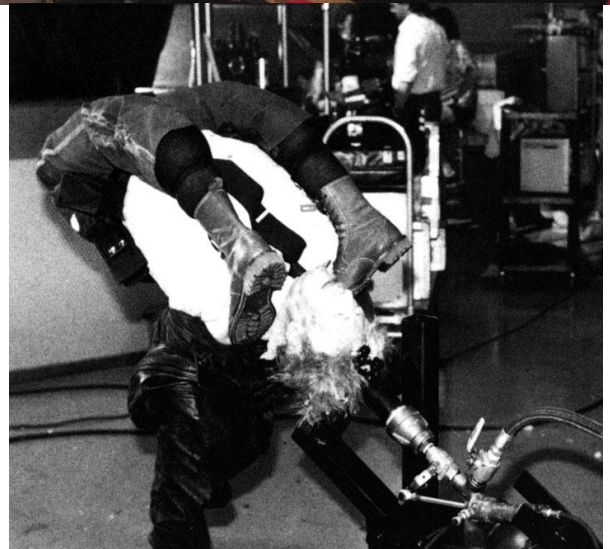


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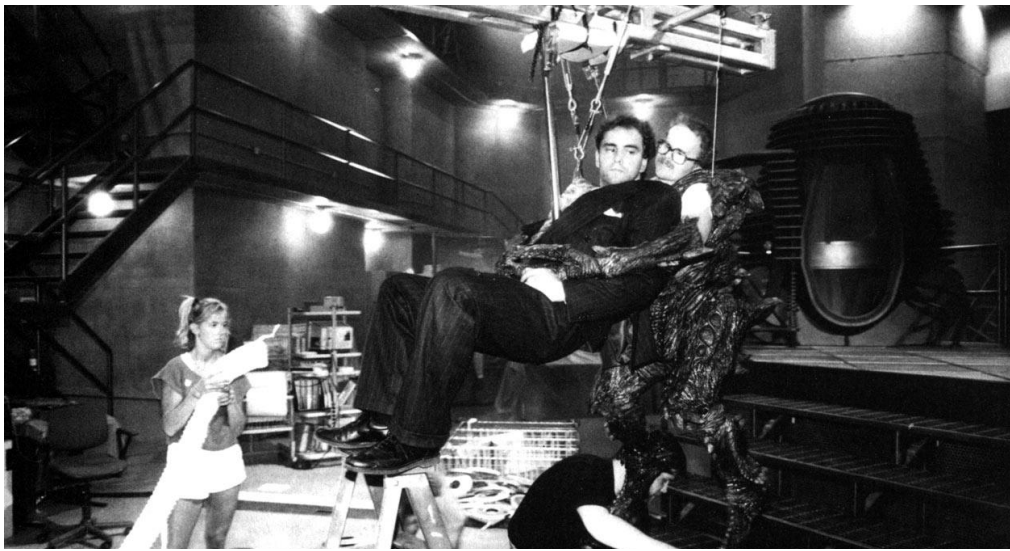
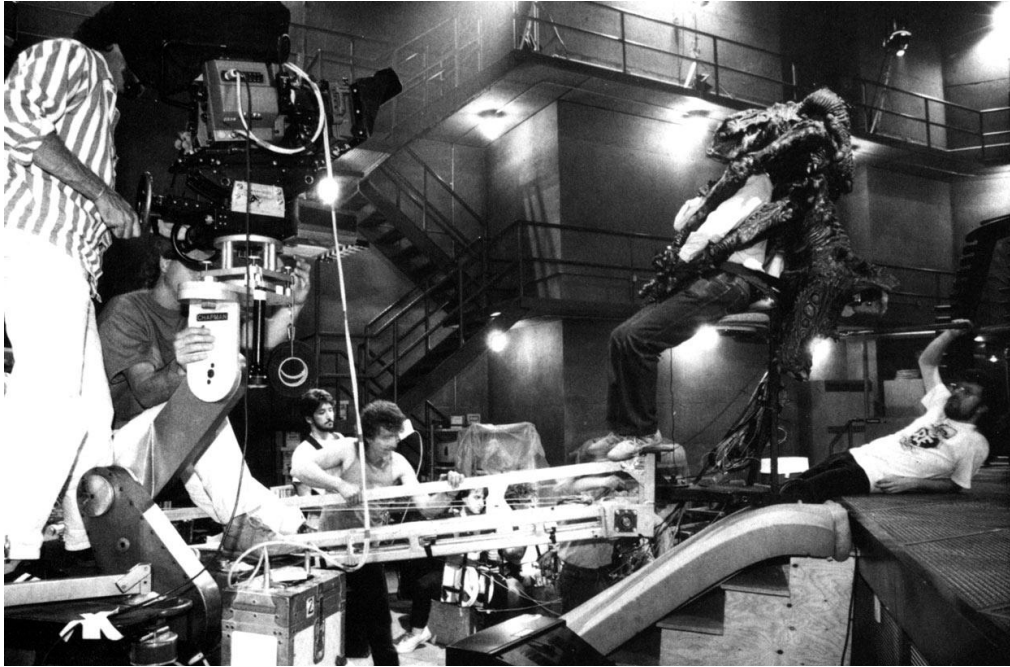
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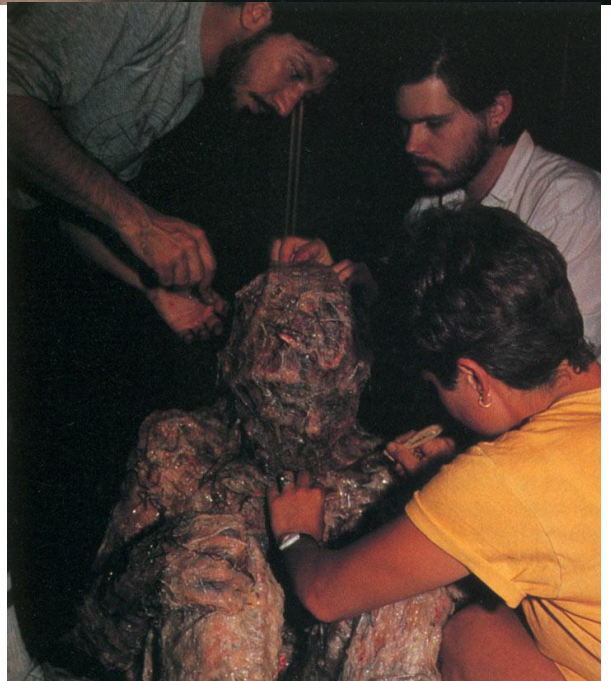
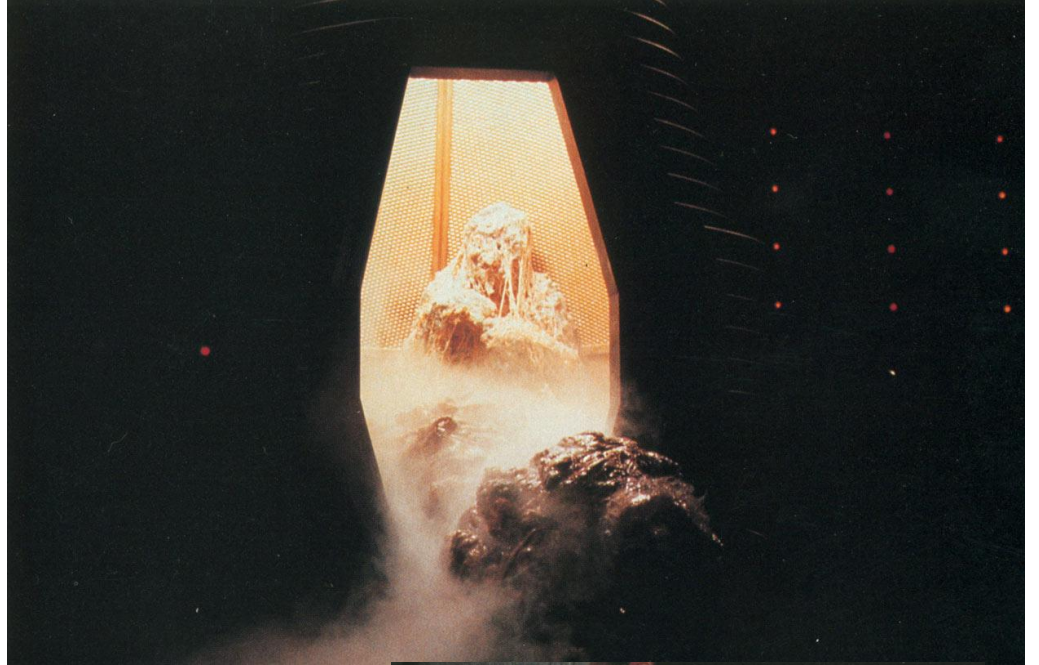
A specially rigged puppet is readied for a scene in which it will vomit corrosive enzyme into the face of security guard Mackenzie /











CINEFEX 3







FROM SCIENCE TO SHOWBIZ

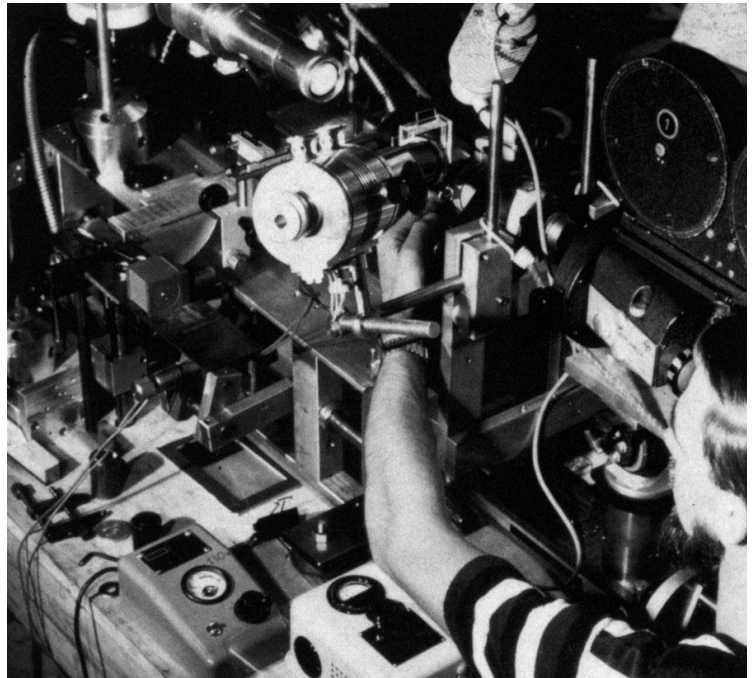
article by
Pamela I

solve problems as they arose. Though at the time it never occurred to them to apply their developing skills to feature films, the experience of those first years provided valuable training and eventually began to attract attention. "I think the thing that sparked the most interest in the outside world was the fact that we were working in high magnification. And that began to lead to the odd request for a commercial. The first commercial I ever took part in was one in which we were asked to film a ladybug crawling up a bean plant and eating some tiny flies. That project immediately exposed us to 35mm, which we had always rather looked forward to getting into. So the first few breaks were actually at the commercial level, and then the feature stuff came as a result of that."

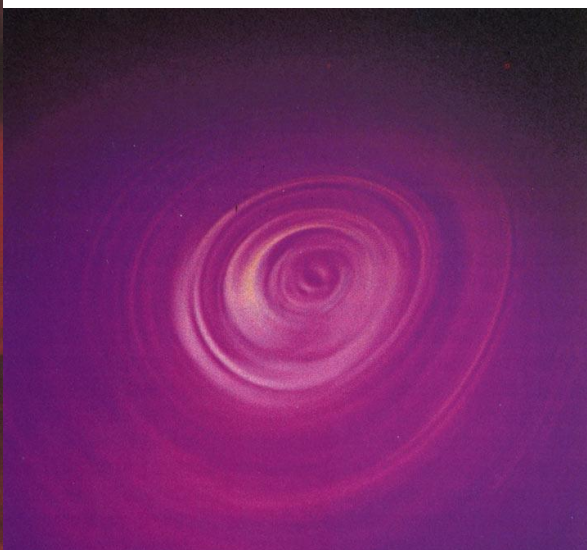
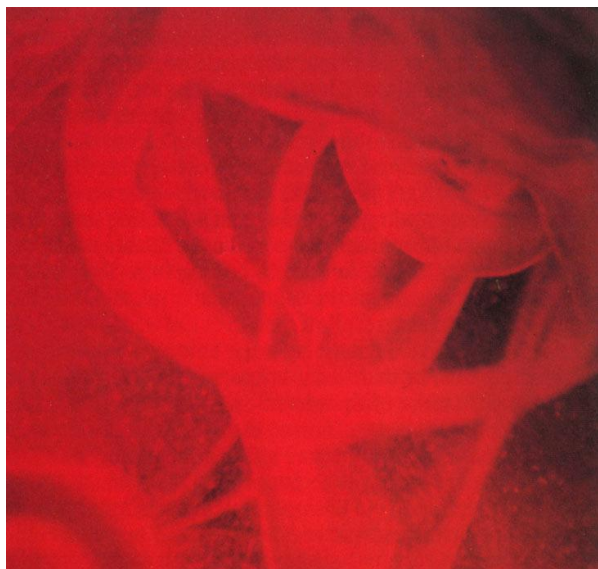
Oxford Scientific's outstanding work in high magnification was made possible by their early development of the dark field optical bench, a piece of equipment that still guides the company's fortunes to this day. "During that first six months when my zoology colleagues and I were still learning to operate the camera at the university, it so happened that a master from school had given me an old Ross microscope on indefinite loan. It was a superb microscope, one hundred and ten years old, accompanied by a mahogany box full of fabulous Victorian optics and thousands of microscope slides — everything from the Lord's Prayer written on the head of a pin to an 1872 five-pound note reduced and photoengraved onto a glass slide. It was a unique experience looking down these extraordinary optics, some of which have really not been redesigned to this day. My father was an engineer, and I had learned a certain amount. So I started to piece together bits of equipment, putting components from this old microscope into our optical system."

The Victorian component that led to a breakthrough for Parks was the low-power dark field condenser. "I found that by turning up an adapter ring out of walnut wood, it was possible for me to relay images from one of the binocular microscope barrels and transfer it to 35mm still film. I still remember the first time I used this device to record microscopic images on film — I worked until three in the morning and realized while driving home that I had gone temporarily blind in one eye. It was caused by a poorly flagged source light shining directly into the eye which was not applied to the reflex viewfinder. But we ended up with one of those sparkling shots — and it was only a matter of a few days before the same system was pressed into movie use."

The concept of dark field illumination addresses what is undoubtedly the most problematic aspect of filming microorganisms — adequate lighting levels. "With all micro lens systems, enormous amounts of light are required at source to provide enough illumination at the film plane. Modern fast stocks have alleviated this problem a lot, but to get such ima-



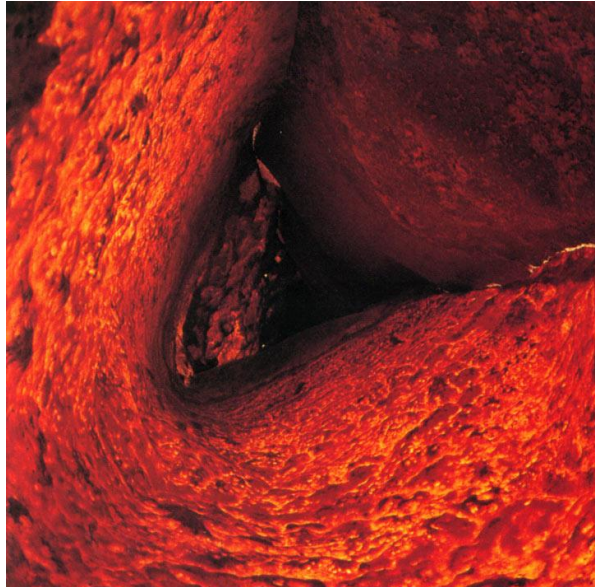




black background achieved by a total lack of light — in other words, true photographic black. Dark field illumination is applied behind the subject with respect to the camera. It collects the parallel beam of source light; and by a black stop which covers two-thirds of the lens center, it subtends a hollow cone of light — the apex of which determines the position of the subject. For good effect, the subject must be at least slightly translucent — which, at this size, most are. Even a pea is translucent under the right illumination. The focal length of the dark field condenser must be less than that of the taking lens on the camera, because only then can the light that fails to strike the object also miss the field element of the camera and thus maintain a one hundred percent black background. Much of the optical bench superstructure is designed to accommodate customized high-intensity micro lamps — each fitted with bubble alignment, variable prefocus reflector alignment and variable spot/flood control. The system is designed to take a five-eighths-inch bar support system which can be deployed and clamped in almost any configuration around the assembly so that lighting is not compromised artistically. Two fiber guide light sources are often employed with the optical benches — similar to fiber optics except that they are noncoherent light guides rather than coherent image guides. They are a convenient and efficient form of lighting in this context."

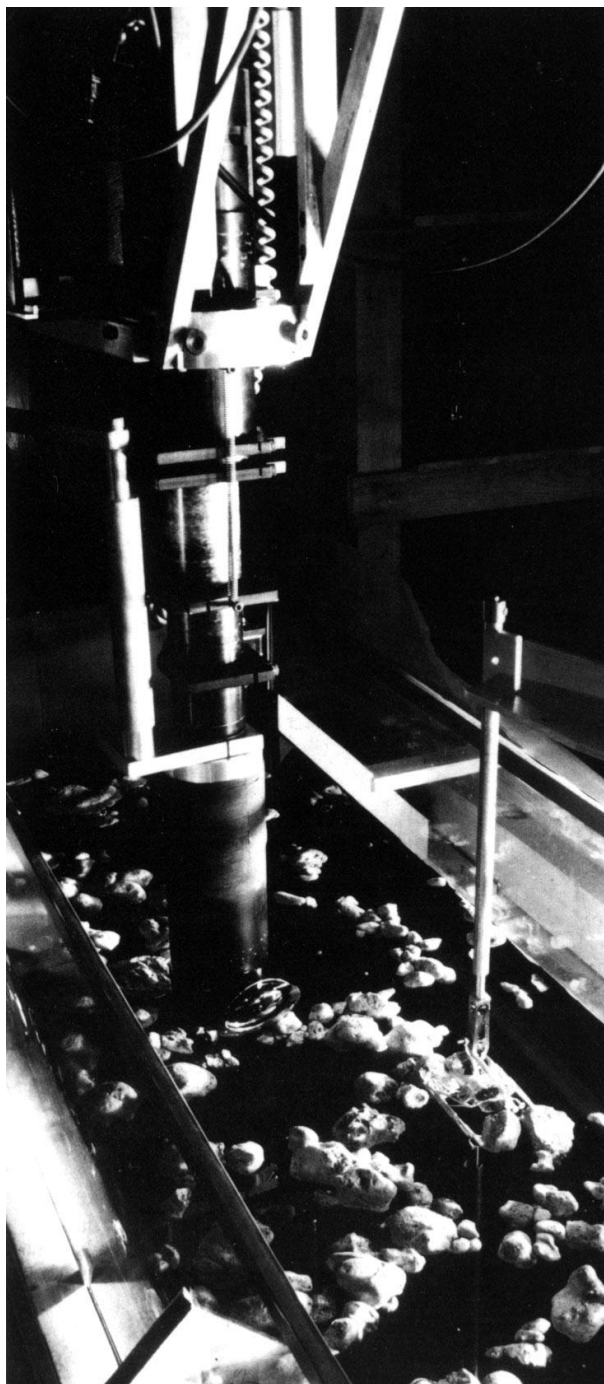
The effort to provide adequate lighting for the film system was complicated by the fact that most of OSF's subjects were live specimens. "We found that we were having to light the whole thing up to about $f/132$ to get any effect at all — and we had to get rid of all the heat from it to keep our specimens alive. So within each of the lamps we stacked two infrared heat filters which cause very little change of color temperature. Each is two millimeters thick and each absorbs about eighty-five percent of the infrared. So by stacking two of them in there, we did not cut the light down by more than about five or ten percent and yet we were cutting the heat down by eighty-five percent and then another eighty-five percent of what was left. The filters can get pretty hot in front of the lampheads, especially when there are prefocused elements behind the lamphead. So we must get them heat-toughened or else they will crack as they cool. It has not been unusual in our experience to finish a shot, hear a loud clattering noise twenty minutes later and find that the heat filter has cracked. The system is also equipped with a parabolic reflective mirror or a dichroic reflector at the back. Dichroics let heat out the back and light out the front; but for the most part, ours were not doing enough — a lot of the heat was coming out through the cooling fins around the side and the chimneys

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A vital component of the first optical low-power condenser in the enormous needed for work, dark was essential focused in concentric source then rendered translucent. A



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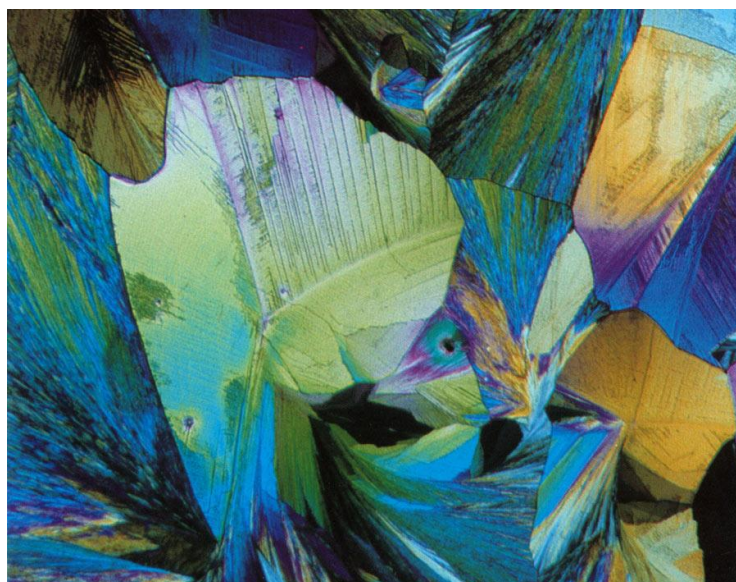
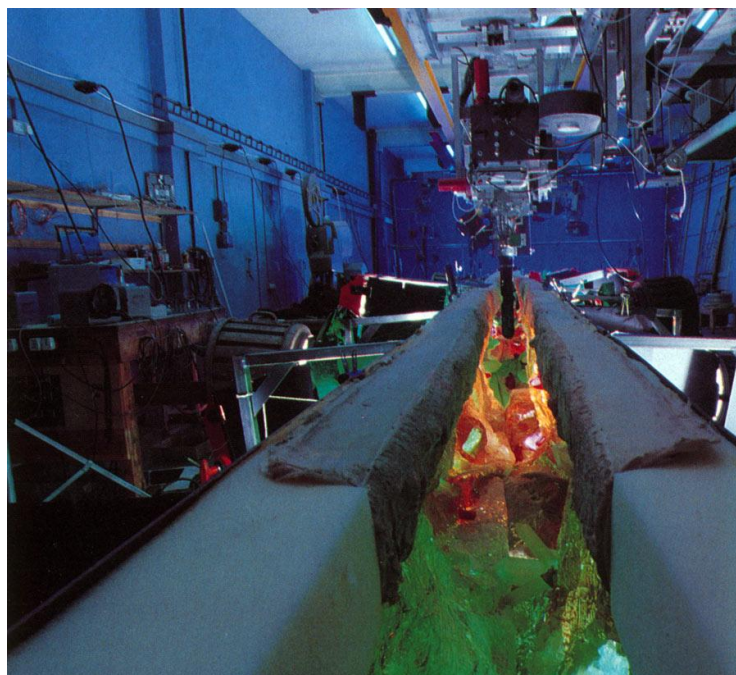


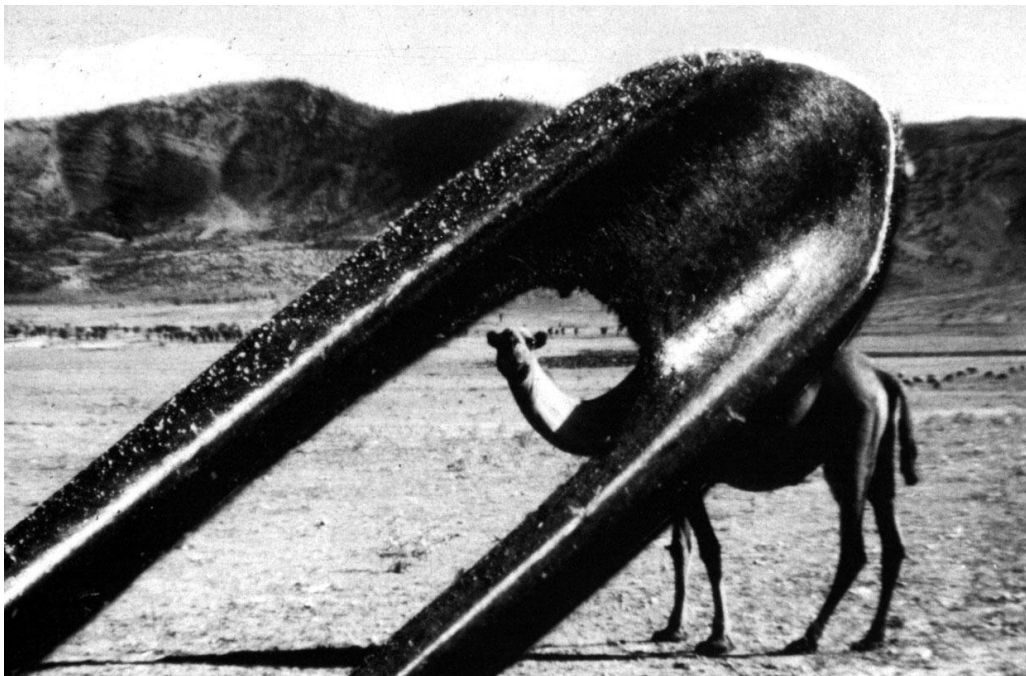
Kara, the combination of events filmed on the optical bench and within the tank translated into a wide-screen journey that was believable as well as dazzling.

Despite OSF's advances in effects technology, some filmmakers still express more interest in the group's wildlife background. Many of the requests that come in from the feature community reflect a well-founded confidence that biologists can better handle special animal shots than can most conventional effects houses. An early example of this low-tech specialty appeared in John Boorman's *Exorcist II: The Heretic*, which called for full-frame tracking shots of locusts in flight. OSF veteran Sean Morris shot the locusts against a backlit bluescreen for later compositing with the background footage. "It so happened that Sean's uncle owns a wire company that specializes in very fine stainless steel wires half-a-thousandths-of-an-inch in diameter. The locusts that were drifting about in the frame were suspended on these half-thou wires. The others — which remained fixed in the frame — were mounted on solid suspension rods. We would just patch the wire or the rod with superglue to a part of the locust that was good and solid — like the back of the thorax. Then they were stimulated to fly by passing an air current over them. At the time, everybody said there was no way you could successfully composite those blurring wings — but Roy Field and his people at Optical Film Effects managed to do it for us."

Years later on *The Emerald Forest*, Boorman approached the group again to photograph shots of an eagle performing specific intricate moves such as descending glides and glances from side to side. The zoologists saw immediately that trying to film a real eagle performing these particular maneuvers would be a waste of time — it was simply not in keeping with their nature. "We persuaded Boorman that if his South American eagle were to stand any hope of doing what his storyboard called for, then it must be a model eagle and not a live one. Eagles are not easy to come by, so we built ours out of two dead buzzards. Phillip Sharpe dismembered the carcasses and reassembled the essential parts upon a fiberglass body encasing four radio-controlled servo motors. With these it was possible to make the bird's tail fan and twist and its head move up and down and left and right — and we were able to attempt gliding flight. The model was slung from an invisible harness which was given manual control particularly in banking and turning. Most of the major moves were then described by one of the overhead camera rigs — this time with no snorkel lens. We eventually came through with the required choreography and the sequence was shot bluescreen and anamorphic."

The snorkel system trench again proved useful when OSF was engaged to shoot one of the opening sequences for *Little Shop of Horrors*. "It was just a very short sequence, where an alley





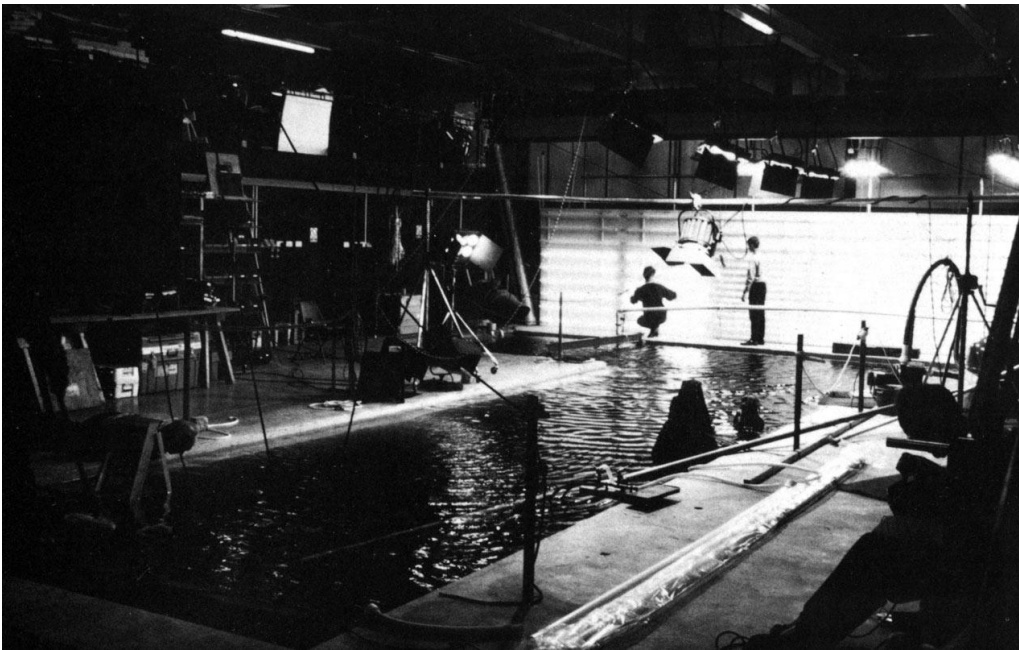
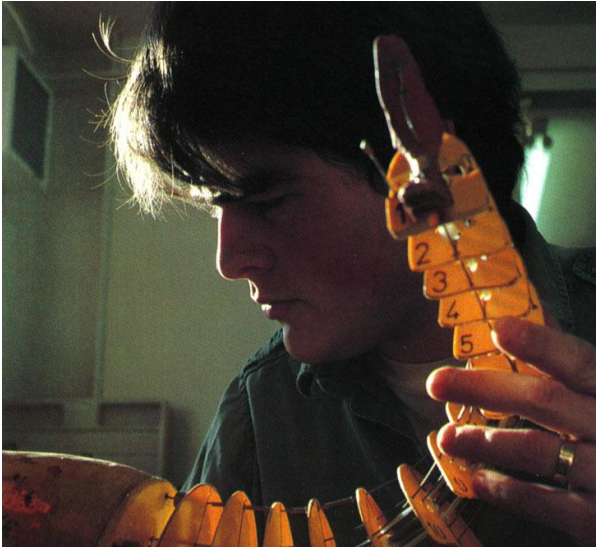
and-fifty-pound Newfoundland dog and black drapes. The idea was that we would pull the drapes and here would be this er... literally inches above the cat. Some of the cats would jump straight out of the frame. But one did a take on the dog, and all its hair went up on its back — which we would have liked perfect and that is the one that went in.

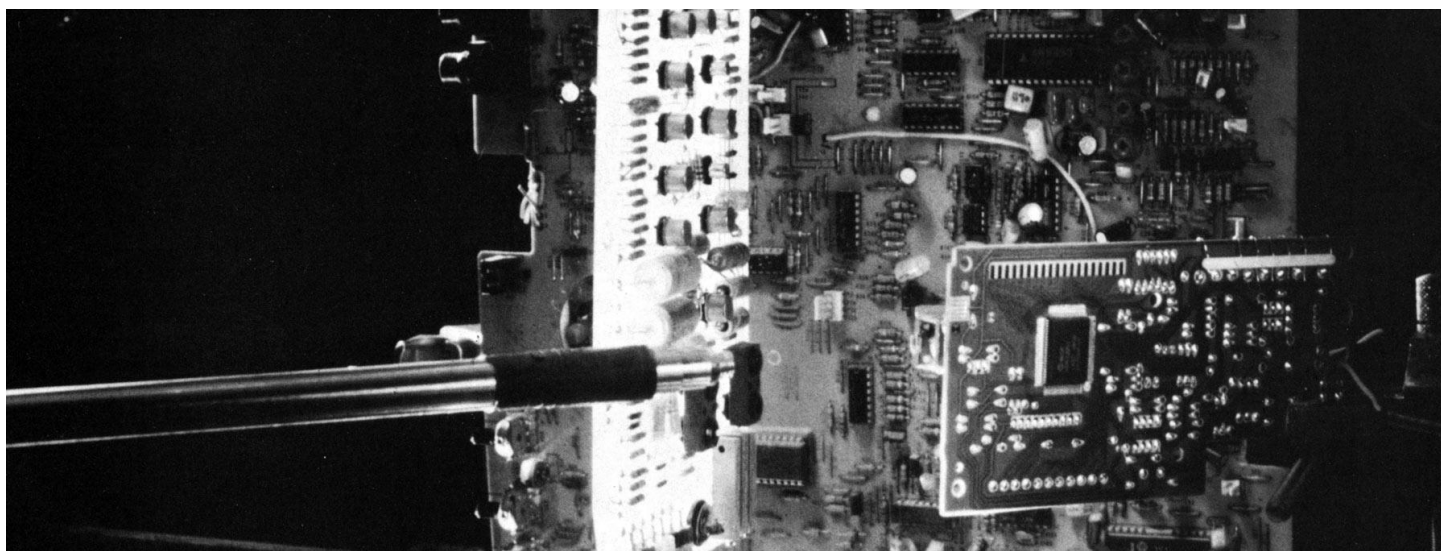
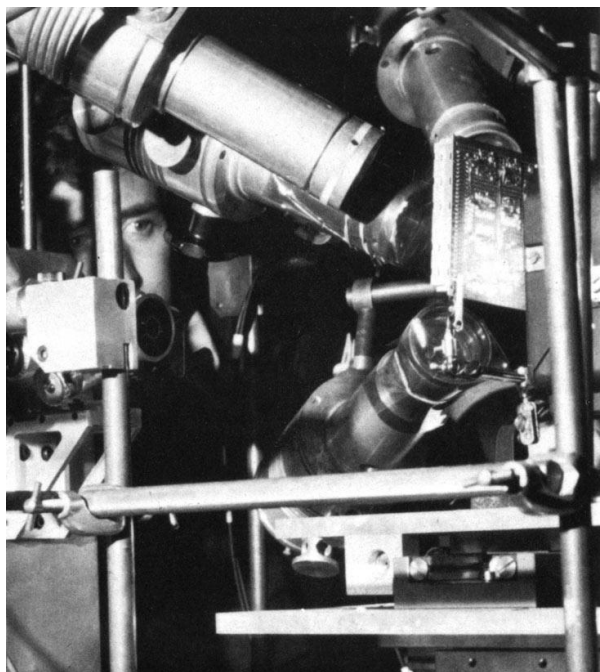
Another throwback to the company's natural phenomena is evident in its core time-lapse techniques. "Sean Morris is the best at our time-lapse capability, which has become more sophisticated over the years. To make the time-lapse more than standard locked-off time-lapse work, we use programmed pans and tilts, focus pulls, and so on — all of which present their own set of challenges. We found that plant and animal studies in dramatic and commercially successful. I remember a modest shot of maggots devouring a mouse carcass — used in a feature called *Gentle Touch* — turned out to be one of the best shots we have ever done. With time-lapse, we were able to create an entire sequence of time-lapses. He has tried many times since to do it, but has succeeded in capturing the same level of detail only once.

Many years later, Alan Parker asked the company to develop a technique for *Pink Floyd - The Wall* — a sequence of a man's head — modeled after Bob Geldof — being minced by Paul Engelen. Sheep's eyes were used to touch the grisly artwork, and cameras were moved every two minutes as a thousand blades were brought about the desired effect. "For the time-lapse sequence in progress, the studios at the time were the place to work. We had sealed the time-lapse with gaffer tape, but the smell was still there."

A more pleasant time-lapse shot was a sequence in *Supergirl* in which Kara looks at a daisy bud. As she looks at it, her laser vision causes it to open and bloom. While the sequence was simple to shoot, timing problems complicated it. When we were first asked to do that shot, it was recommended a camomile daisy. But the department made a plastic look-alike bud for the shoot. The only thing was that no one had been successful in our bid to do it until it had either been dropped or someone else had done it the time we heard otherwise it was available to find any of the chosen daisy species in the daisy family. Eventually we found





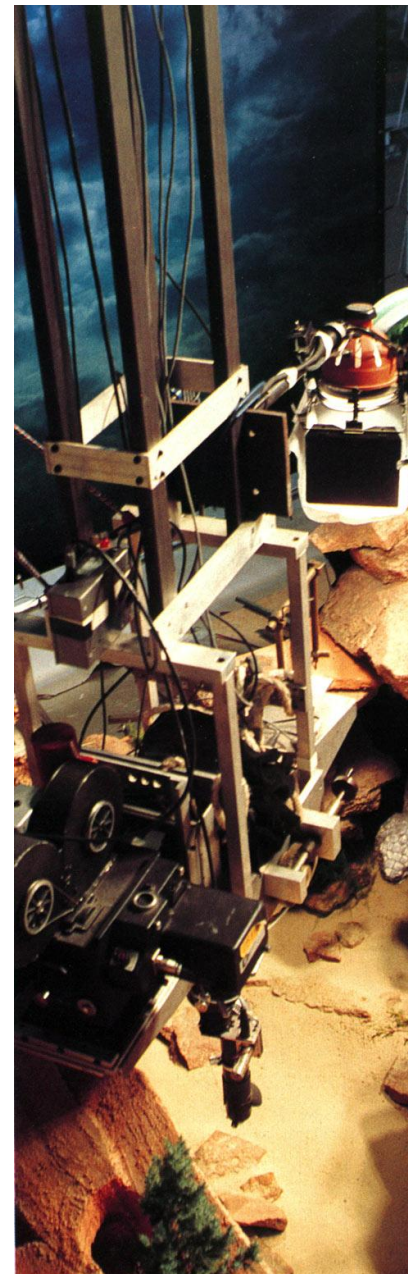


An animatronic snake is made ready to strike at an advancing snorkel rig during effects photography for a television miniseries adapted from The Lost World. / A combination of wet and dry model photography was employed to produce the underwater effects in Deepstar Six. Perched on the rim of a vast oceanic cave — a miniature setting fashioned principally from sculpted styrofoam — the Seatrack submersible vehicle is photographed dry with an overhead snorkel rig and pitching lens. / To create convincing bursts of debris and silt, the collapsible sea floor was filmed underwater. Effects crew members tend winches that will release the fiberglass floor sections on cue. / Drawing on extensive first-hand experience in actual marine environments, veteran OSF team members were able to enhance the believability of their dry photography with optical

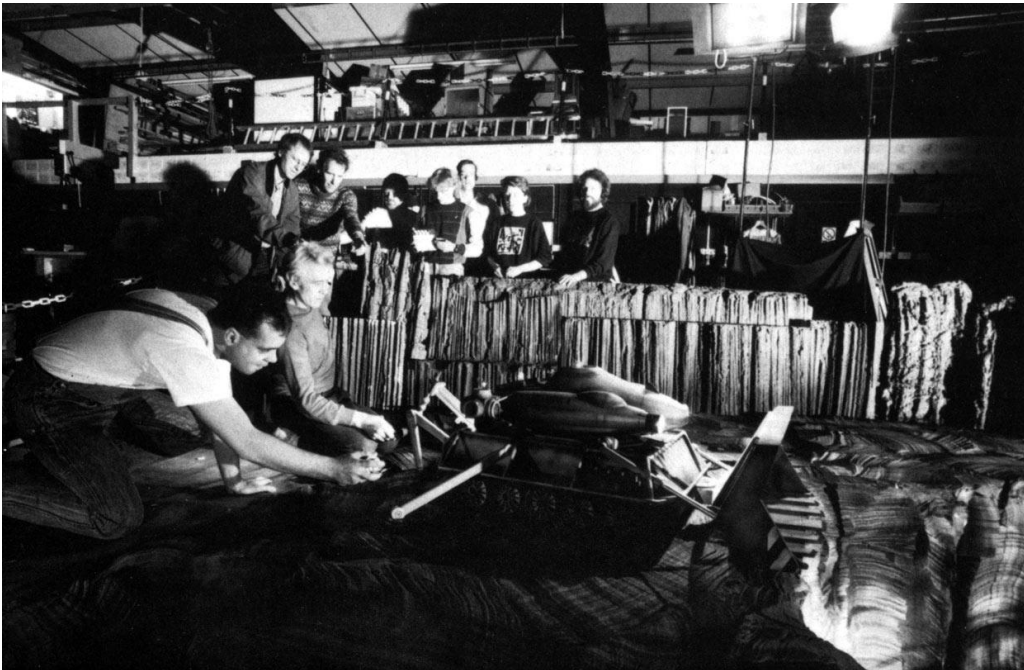
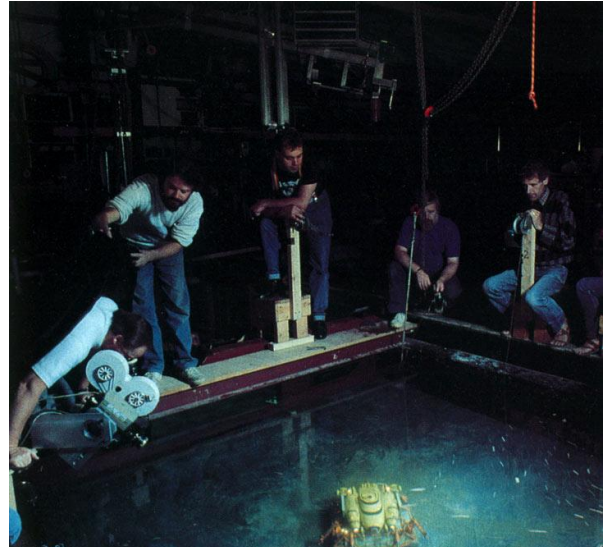
— with the Pathfinder rig — to track, crane, pan, tilt, crab and skew. We were obliged to light pretty heavily, and the Pathfinder — which is designed to track over ninety feet at relatively high speeds — was tested to its limit of steadiness covering distances of no more than fourteen inches. But our cameramen — Bob Brock, Pete Hughes and Pete Field — did manage to execute some very elaborate journeys." Some of these journeys were over items as small as a circuit board or a microchip. To shoot these sequences, OSF turned to its latest model of the optical bench — the Micro-Zoom. "Extreme magnifications were required for *Pulse*. Microchips had to be so highly magnified as to make their pathways look like Los Angeles from a low helicopter at night. Solid-state microcircuit boards had to be flown through so as to make their components look like suburban localities. That kind of shot requires about thirty or forty times magnification. To execute the tracking moves, we turned both the subject and the camera on end and moved the subject on a horizontal cross slide. We angled the camera to accomplish diagonal moves on a single axis. One great benefit of the Micro-Zoom optical bench is its ability to rotate the camera three hundred and sixty degrees with great control. Every shot done on the optical bench utilized this facility — banking and zooming and rolling."

The optical bench was also called into use for the spectacular pyrotechnics which provide much of the effects action in *Pulse*. Electrical arcs, rupturing solder traces, exploding capacitors and flying sparks were among the macroscopic events captured on film. "I think *Pulse* represents the first time ever that the actual spark gap activity of mercury microswitches, contact breakers and overloaded capacitors has been recorded on feature film format." The climax of the film called for circuit boards to redesign themselves, lines of electrical force to flow over the circuitry and spectacular destruction to occur among the small components within a television set. "Filming solder traces rupturing, melting, flowing and refusing seemed fairly easy at the outset. In reality, we found that we had a lot to learn about melting points, surface tensions and fluxes. John Short — our in-house gaffer — educated himself and then the rest of us by patiently working with a small mountain of scrap circuit boards. After that it was just a matter of stepping up voltages and then filming the conflagration or whatever took place. The entire project was alien to our background in that the subjects were all inanimate, but it provided its own set of challenges and was really quite fun."

Although the majority of OSF efforts center on feature films — undoubtedly the most lucrative projects for the company — even that field of endeavor continues to feel the influence of the group's scientific background. It manifests itself clearly in *Umbrij* — a feature project which Parks and company have been developing for the past several years. Initially financed with







the story and its potential. "The influence because some of the characters we have were actually influenced by some of the countered on our deep-sea expeditions story several years ago in the hope that it would be the way that our new effects studio sort of story that it could tell. We are very much which would make full use of the animation image relay technology that went into it."

Though the *Umbrij* project itself has helped to develop the technology for it helped to win a contract for a television miniseries by Doyle's *The Lost World*. Working within budget, the effects team was able to create a tropical jungle, a huge prehistoric snake, a tyrannosaurus rex. No sooner had been completed than OSF received an order for *Deepstar Six* from effects coordinator. The film — produced and directed by Sean Connery — set six miles beneath the surface of the ocean for the effects group's particular floodable pit, our new facility was well equipped for effects — particularly deep-sea effects. A lot of my work had been in the marine area. A recent hardware design at OSF had included a controlled-motion snorkel photography rig. As *Leonard Part 6* turned out to be, it had been a great opportunity to establish one of the very few — if not the only — effects studio capable of reproducing genuine underwater scenes.

Set in *Deepstar Six* — an underwater station of missile launch sites — the film is a tent release from a long-sealed cave of that invades the station and slaughters it. As proposed and accepted, OSF would build the underwater vehicles, stations, dig the crew of twenty — headed by Jez Harris with key support from Rich Gregory and at once on the huge assignment. "In the work and set construction, we had a lot of engineering to complete — including the installation of plumbing and filtration systems. Ron Swinden undertook this job with J. We contracted an outside firm to manufacture bulkheads with one-inch-thick film in which were inclined at twenty degrees to



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